

Neither the worms nor the larvae are transmitted person to person, and the worms can only reproduce in their human hosts.

Donald Hopkins, who retired as deputy director of the National Centers for Disease Control and Prevention and is now with former President Jimmy Carter's private health program, Global 2000, has waged a quietly effective, personal campaign against the disease for many of the past 25 years.

Hopkins' eradication strategy includes two simple but remarkably effective objectives. First, all persons in epidemic areas are given fine mesh cloth and taught to filter their drinking water. Second, health education programs are implemented to encourage persons to stay away from the community water supply when the worms are emerging from their bodies. As a result of this approach the number of persons newly infected with guinea worm has decreased from about one million per year to a few hundred thousand per year over the past three years. If the present trend in disease incidence continues, the disease will be eradicated within three to five years.

Former President Carter has helped raise over \$40 million in contributions from a variety of sources to support the eradication campaign. He also visited epidemic areas in eastern Africa in August to call attention to the international effort. Carter's prestige and influence in developing nations have lent importance and credibility to the guinea worm eradication effort among high-level government officials and among the residents of the epidemic areas.

If the project is successful, a low-technology, environmental public health intervention strategy will be responsible for the eradication of one of the most gruesome parasitic diseases known.

## EPA Nominations Made

President Clinton has made nominations to fill key assistant administrator positions in the program offices at the Environmental Protection Agency. After the candidates are confirmed by the Senate, they will manage the implementation of the categorical environmental protection activities defined in federal law.

Lynn Goldman has been nominated as assistant administrator for prevention, pesticides, and toxic substances. Goldman, a toxicologist with the California Department of Health Services, will manage EPA's programs in pollution prevention, pesticides, and toxics programs. Toxics programs include the activities authorized under the Toxic Substances Control Act and Federal

Insecticide, Fungicide, and Rodenticide Act. Goldman served as a counselor to the National Toxicology Program.

Mary Nichols, an attorney with the National Resources Defense Council in Los Angeles, has been nominated as assistant administrator for air and radiation. She will manage the implementation of the Clean Air Act amendments, the radon and other radiation programs, and the indoor air pollution control activities at EPA. Nichols was California Secretary of Environmental Affairs and chair of the California Air Resources Board from 1979 to 1982.

Robert Perciasepe has been nominated as assistant administrator for water. Perciasepe, Secretary for the Environment in Maryland, will manage the EPA programs authorized by the Clean Water Act and the Safe Drinking Water Act. These federal statutes are due to be reauthorized by Congress and have major impacts at the state and local levels.

The nominee for assistant administrator for solid waste and emergency response is Elliot Laws. Laws, an attorney in private practice in Washington, DC, will administer the Superfund hazardous waste program and the federal activities related to the disposal of municipal solid waste. The Superfund Program has been widely criticized by community groups, industry, and environmentalists and is scheduled for reauthorization in the next session of Congress. Laws has considerable federal experience as a litigator in the Department of Justice Land and Natural Resources Division from 1985 to 1987 and in the Office of Enforcement and Compliance Monitoring at the EPA.

Bailus Walker has withdrawn his candidacy for assistant administrator for Research and Development. Walker, dean of the School of Public Health at the University of Oklahoma, cited unreasonably long delay in the nomination and clearance process and his commitment to the university in the letter explaining his withdrawal. Administration officials have not yet proposed another candidate, and it is not known when an administrator of this important program office that manages the engineering and health research activities for EPA will be named.

## New NIH Director

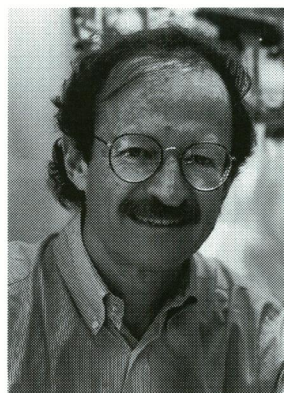
Harold Varmus, a cell biologist from the University of California at San Francisco, was nominated by President Clinton on

August 4 to direct the National Institutes of Health. In announcing the nomination, Secretary of Health and Human Services Donna Shalala described the appointment as "absolutely first rank."

As the director of NIH, Varmus will manage the largest and most complex biomedical research effort in the world. The NIH is made up of 24 institutes, centers, and divisions. Among these are the National Cancer Institute, the National Institute of Allergy and Infectious Diseases, and a clinical center at its 300-acre headquarters in Bethesda, Maryland, and the National Institute of Environmental Health Sciences in Research Triangle Park, North Carolina. The NIH has about 15,000 employees and an annual budget of about \$11 billion. Approximately 80% of the NIH budget supports research and training grants to scientists throughout the United States.

American preeminence in medicine and human biology and physiology is attributed largely to the NIH program of extramural research grants and intramural science that have been developed over the past 40 years.

Varmus takes over NIH at a critical period. Each week brings a report of major new findings in the fundamental mechanisms of disease and in the treatment of previously intractable conditions. But even as these achievements are announced, NIH is not prospering as it has in the past. Traditionally, Congress exempted the NIH from budget cuts often exacted on other domestic programs. In the 1980s, the NIH budget increased dramatically; in the past two years this trend has not continued. The NIH appropriation has not kept pace with inflation. Thus, the number of new grant applications funded by NIH has not grown, and university-based scientists are frustrated by the fact that their research proposals receive high marks in peer review yet are not funded by NIH. Support for fundamental, nontargeted research, long a staple of the NIH grant system, has decreased as NIH is pressed to be more responsive in applying research to the resolution of the immediate health needs of victims of AIDS and of women, the elderly, and the poor. Allegations of scientific fraud on the part of a few NIH and NIH-supported researchers and recent reports of sexual harassment and failure to promote minorities and women have eroded some of the public's confidence in science and in the management of NIH.



Harold E. Varmus—Nobel Prize winner seeks change for NIH.

Karen Preuss

Varmus's record of achievement suggests that he will meet the challenges confronting him as new director. In 1989, Varmus was awarded the Nobel Prize in Medicine for discovering oncogenes and describing their role in the molecular biology of cancer. His research interests also include viruses involved in human disease. In addition to his research, Varmus taught several basic science courses to students at the UC-San Francisco Medical School. He studied English at Amherst as an undergraduate and received a master's degree in English literature from Harvard before graduating from medical school at Columbia University. Varmus spent two years at NIH in the 1970s as a clinical associate in the National Institute of Arthritis and Metabolic Diseases.

In what may become a blueprint for the administration of the NIH under his leadership, Varmus co-authored a forceful plea to President Clinton and Vice President Gore for support for science in the 22 January 1993 issue of *Science*. In a Policy Forum article, Varmus stressed the potential benefits of science in resolving the health, environmental, and economic problems facing the nation. He went on to make 11 specific recommendations to help realize the potential of science. Some of these recommendations included developing an economic strategy to encourage investment in biomedical research, encouraging technology research in the private sector, and stimulating alliances between industry and academia, establishing NIH as an independent federal agency, and strengthening the position of the presidential advisor on science and technology. The nomination of Varmus must be approved by the Senate. If confirmed, he will be in a powerful position to implement his recommendations at NIH.

Varmus will have one important ally in his new position. In July, the Senate confirmed President Clinton's appointment of Phillip R. Lee as assistant secretary for health in the Department of Health and Human Services. Lee will be Varmus's immediate superior in the Public Health Service. Lee returned to Washington (he was assistant secretary for health in the Johnson administration) from the UC-San Francisco where he directed the Institute of Health Policy. Earlier, Lee was dean of the medical school where Varmus taught and conducted research. Lee has a long history of contributions in the field of health care policy research. He has been deeply

involved in developing the health care reform agenda for the Clinton administration.

## Arsenic and New Data

Exposure to high levels of inorganic arsenic through inhalation or ingestion causes cancer, a fact that was never challenged at the July 28–30 International Conference on Arsenic Exposure and Health Effects. Hours of conference presentations and debate centered instead on ways to use data on documented health effects from high arsenic exposures to predict effects at the lower levels commonly seen in U.S. communities. Keynote speaker Warner North of Decision Focus, Inc., emphasized that there are significant, unresolved issues "in extrapolating from worst case scenarios" and suggested it may be necessary to move beyond standard risk assessment methods when evaluating the carcinogenicity of arsenic. Arsenic exposure occurs most commonly in the U.S. from dietary intake, soil or dust around old mine and smelter operations, coal fly ash, and the use of arsenical pesticides.

An arsenic standard for drinking water must be proposed by September 1994 to satisfy a court order against EPA. Charles Abernathy, a toxicologist with the Risk Assessment Branch of EPA and co-chair of the conference, said that a crucial component of EPA's risk assessment is Taiwanese research which links skin cancer to high levels of arsenic in drinking water. More recent studies in Taiwan also found internal organ cancers (e.g., bladder and kidney cancers) in the population studied.

The lead author of the Taiwanese studies, C.J. Chen, presented new data showing not only cancer but also an elevated risk of ischemic heart disease among residents of southwest Taiwan who drank water with high levels of arsenic. Previous studies of well water in this area of Taiwan found arsenic levels between 10 and 1820 micrograms per liter ( $\mu\text{g/l}$ ).

The current U.S. standard for arsenic in drinking water is 50  $\mu\text{g/l}$ . Several EPA representatives indicated that an EPA risk assessment, based on the Taiwan skin cancer

data, would likely result in a proposed standard of 2–5  $\mu\text{g/l}$  of arsenic; the number would be even lower if the internal organ cancers are part of the equation.

Requiring all water systems in the country to comply with a 2  $\mu\text{g/l}$  standard would cost \$6.3 billion, according to J. Alan Roberson of the American Water

Works Association (AWWA). The highest impact would be on Western states, where water generally has higher arsenic levels.

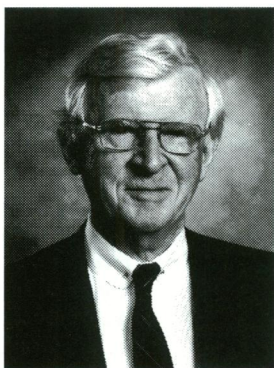
Other water utility speakers urged EPA to seek an extension of its deadline to accumulate more scientific and economic feasibility data, arguing that the population in Taiwan is significantly different from the U.S. population. Chen agreed that diet and socioeconomic characteristics between his study population and the typical U.S. community vary, but said his studies provide persuasive evidence that inorganic arsenic causes human cancer.

Conference attendees agreed that much more research needs to be conducted on the mechanism of arsenic carcinogenicity, especially in the areas of pharmacokinetics and metabolism. There is convincing data that inorganic arsenic causes human cancer, but no animal model has been able to reproduce the effect. A key research question, participants agreed, is the dynamic of how much inorganic arsenic is ingested, how much is delivered to internal organs, and how much is converted to methylated forms and excreted.

A heated topic of debate was whether there is a linear dose-response relationship for arsenic or if instead there might be a threshold at which ingested arsenic fails to cause a cancer risk. Roberson told *EHP* that the EPA drinking water standard for arsenic could remain unchanged if there is a threshold for cancer at 50 or 100  $\mu\text{g/l}$ . Allan Smith of the University of California, Berkeley, on the other hand, has argued that the available evidence does not support a threshold theory. He told the audience, "Until you have studies at low dose rates you have to extrapolate." [See Smith AH, "Cancer Risks from Arsenic in Drinking Water," *EHP* 97: 259–267 (1992).]

Co-chair Abernathy believes the conference met its aim: to allow rational discussion of the Taiwan data among people with diverse views, ranging from analytical chemists to water works engineers to environmentalists. The conference "made clear the uncertainties of the economic impact and health impact of regulating arsenic," Willard Chappell of the University of Colorado, Denver, told *EHP*. Chappell urged EPA to consider all new research data when making its regulatory decisions, warning, "billions of dollars are at stake here."

The three-day conference was sponsored by the Society of Environmental Geochemistry and Health, the Agency for Toxic Substances and Disease Registry, EPA, the American Water Works Association, Atlantic Richfield Co. (ARCO), the American Mining Congress, the Electric Power Research Institute, the International



Phillip R. Lee—a deep interest in health care reform.

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